

MSS - Fault Management

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**ECS Release A SDPS/CSMS Critical Design Review
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Overview



Fault Management provides the following functional capabilities:

- **Detection, Notification, Isolation, Diagnosis, Recovery from faults & Trends Analysis**
- **Lookup of the status of resources - service provided to ECS subsystems**

COTS Selections (Highly COTS-intensive):

- **HP OpenView Network Node Manager**
- **Fault/Performance Management product**

Changes since PDR:

- **Monitoring of transient processes**

Overview (cont.)



Two implementations with different scope:

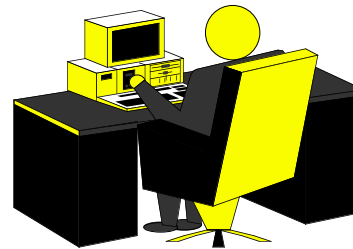
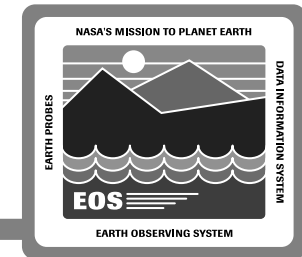
- **LSM**

- **Resource-oriented, site-specific view**
- **Real-time fault notifications from/about site resources and services**
- **Trends analysis of faults scoped for site resources and services**

- **SMC**

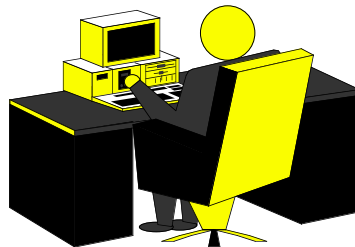
- **Service-oriented, system-wide view**
- **Non-real-time, off-line post processing**
- **Real-time monitoring of local resources**
- **Trends analysis based on service-oriented, end-to-end, system-wide view of fault data**

Fault Monitoring Views



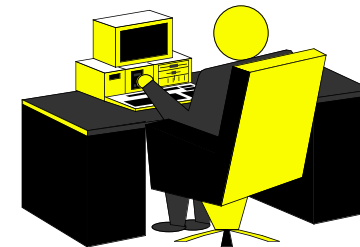
SMC Operator

- Generates system-wide fault trends data from summary information received from sites and logged in management database
- Service-oriented, system-wide scope of faults
- Non-real-time, off-line post processing
- Real-time monitoring of local resources



LSM Operator

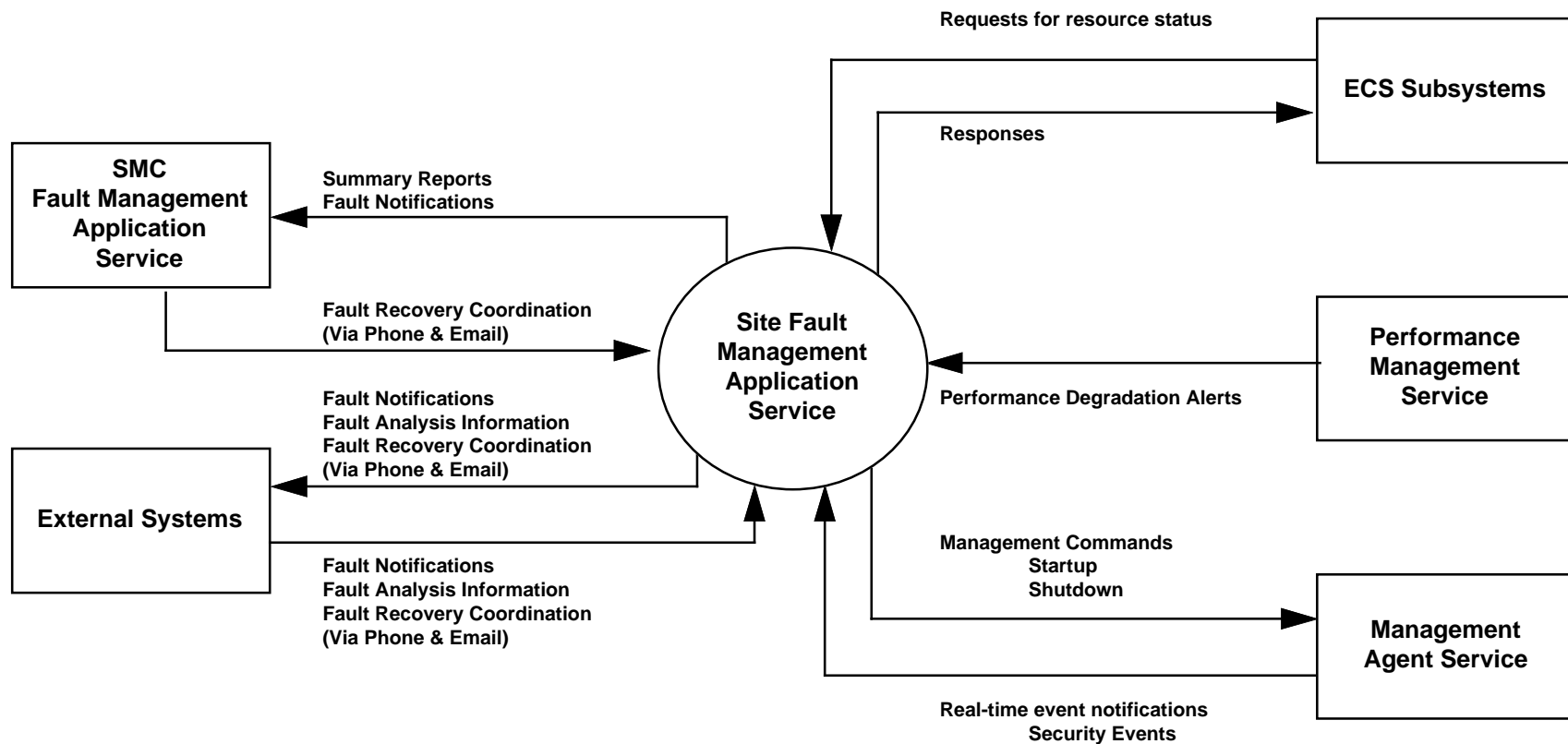
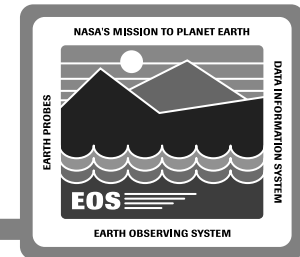
- Monitors faults in site ECS resources in real-time via HP OpenView and Fault Management COTS GUI screens
- Isolates faults through diagnosis using tools provided
- Initiates recovery actions to restore to operational state
- Analyzes trends on site specific resources
- Site-specific scope for fault management



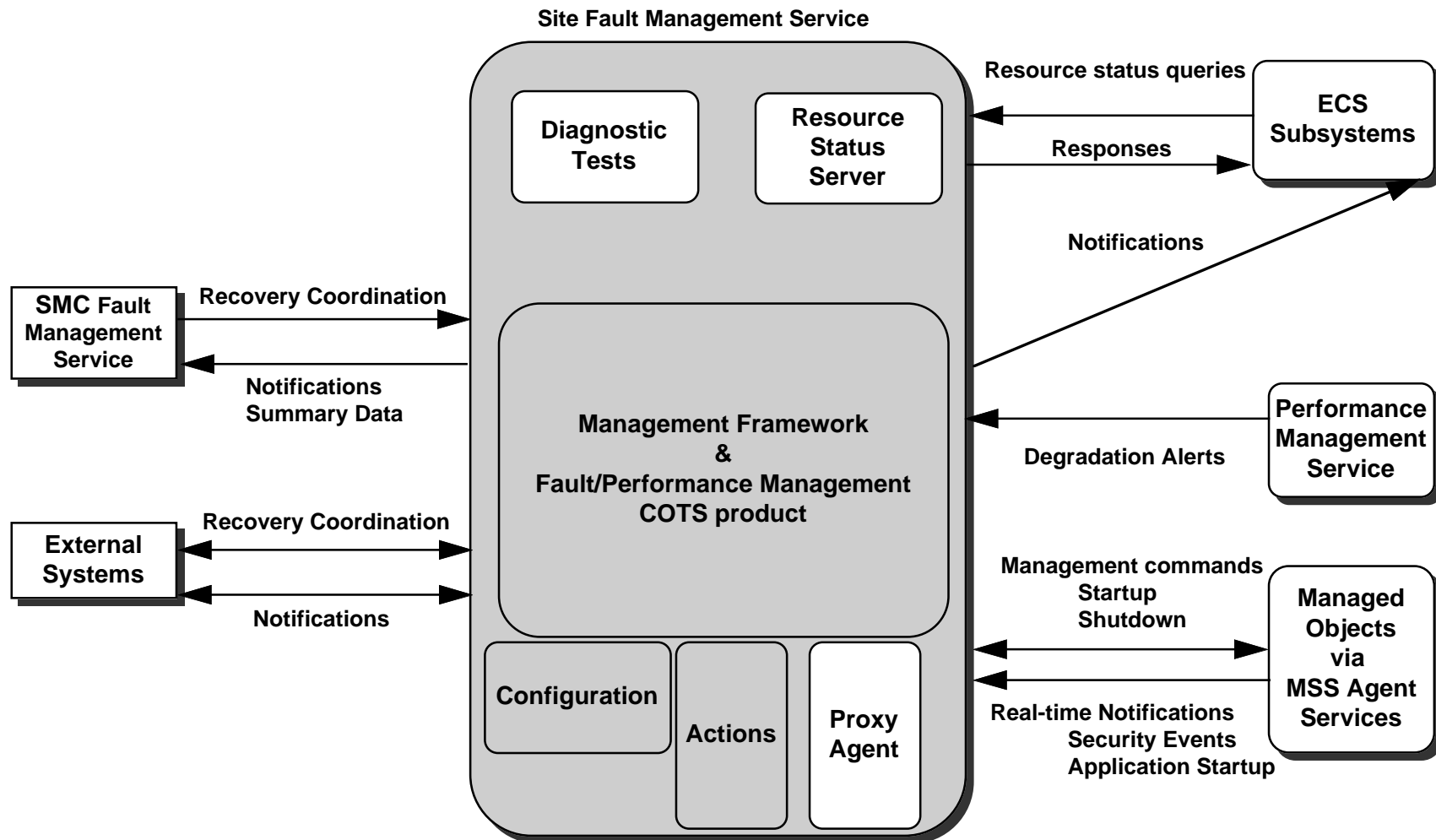
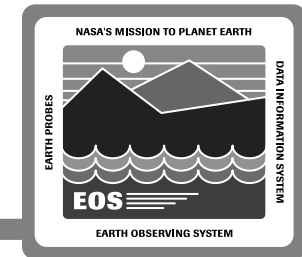
ECS Subsystem Operator

- Receives notifications of errors within the subsystem

Fault Management Context



Fault Management Design



Design Description



Components

- **Management Framework & Fault/Performance Management Product**
 - Graphically displays the real-time configuration of site network topology
 - Uses color-codes for symbols to representing the state of the corresponding objects
 - Provides visual and audible notifications of alerts received
 - Provides a log browser
 - COTS + configuration
- **Actions**
 - Provides the actions to be executed in response to faults
 - Initiated manually (by operator) or automatically
 - Scripts + custom
- **Resource Status Server**
 - Provides responses to queries on resource status
 - Custom

Design Description (cont.)



- **Management Proxy Agent**
 - MSS manages itself as it manages other subsystems
 - Provides lifecycle services (e.g., Startup and Shutdown)
 - Reuse of ECS custom software
- **Diagnostic Tests**
 - Vendor-provided tests for faults diagnosed to equipment

Interfaces

- **ECS Subsystems**
 - Provides a lookup for status of resources (e.g., PLNG Processors)
- **Performance Management**
 - Receives notifications of thresholds exceeded
- **Management Agents**
 - Receives real-time fault and security notifications
 - Provides lifecycle services (startup and shutdown)

Design Description (cont.)



- **External Systems**
- **SMC**
- **Management Data Access**
- **Management Database**

Operator Interface

- **HP OpenView and the Fault/Performance Management Application GUIs**

Representative Faults and their Detection



Hardware (Routers, Hubs, Hosts and Servers)

- Detected and reported by agents within the devices via SNMP traps
 - Link up
 - Link down
- Detected and reported via SNMP status polling by HP OpenView
 - Node up
 - Node down
- These are standard and widely used detection mechanisms

ECS Custom Software, COTS Software and Host Peripherals

- Detected and reported via Management Agent Services and the Fault/Performance Management product
- Well-defined interface provided for ECS Applications to report faults

Events may be suppressed so as to control network traffic (congestion)

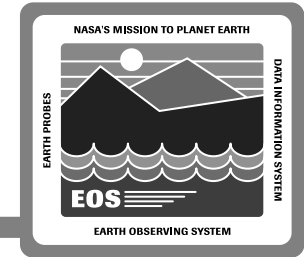
Representative Faults and their Detection (cont.)



ECS Custom Software, COTS Software and Host Hardware

- CPU Errors
- Memory Errors
- Disk Errors
- Tape Errors
- Printer Errors
- Process Errors
- User Pull Area Full (Storage Management)
- Data Staging/Destaging Error (Processing Subsystem)
- Database Tablespace Fragmented
- Excessive locks created

Fault Notification



Notification mechanisms provided by HP OpenView:

- **Visual notifications**
 - **Icon changing color**
 - **Pop-up notification window**
 - **Message in event browser window**
- **Audible notifications**
 - **Ringling of a bell with an alert**
- **Execution of user-specified process to**
 - **Send notification via beeper to designated destination**
 - **Send notification via electronic mail**
 - **Forward the notification to a specified destination**
- **Configurable by the operator**
- **May be disabled/suppressed to reduce screen clutter**

Notification mechanisms provided by the Fault/Performance Management Product integrate with those of HP OpenView

Isolation, Diagnosis and Recovery



Services provided (Tools Available):

- Event Log Browse capability
 - HP OpenView Event Browser
 - MDA Event Log Browser
- Diagnosis of Equipment
 - As provided by the vendor
- LAN Error/Fault Analysis
 - LAN Analyzer
- Correlation of events (As provided by COTS)

Recovery Actions:

- Operator initiated
- Automatic

Summary



Benefits

- **COTS-intensive (Stable products in widespread use)**
- **Lowers development risk**
- **Reduces maintenance costs**
- **Provides a high degree of configurability, flexibility and scalability**
- **Prototyping activities underway (EP6)**
- **Manageable through the MSS Management Agent Service**
- **Provides a well-defined interface for reporting faults**
- **Provides for the early detection of faults, reducing the Mean Down Time (MDT) of failed components, in support of system-wide RMA requirements (Beating the phone call!)**
- **Demonstration in the ST Lab after the presentations**